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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/646,190

08/22/2003

Gilles Amblard

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10/19/2005

AMIN & TUROCY, LLP

1900 EAST 9TH STREET, NATIONAL CITY CENTER

24TH FLOOR,

CLEVELAND, OH 44114

EXAMINER

PUNNOOSE, ROY M

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/646,190	<b>Applicant(s)</b> AMBLARD ET AL.	
	<b>Examiner</b> Roy M. Punnoose	<b>Art Unit</b> 2877	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 August 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the monitoring component that analyzes the photoresist must be shown or the feature(s) canceled from the claim(s). The figures show that the monitoring component monitors the shrink component, but it does not indicate the analyzing of the photoresist. Appropriate correction is required. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

2. Claims 8 and 15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification contains the full expansion of the acronyms RELACS and SAFIER (on page 9), but does not have any definitions of it. Therefore the acronyms have not been provided any patentable weight. For examination purposes they have been treated as generic non-lithographic shrink components. (It is not clear if it should be SAFER or SAFIER.)

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3, 6-11, 13-21 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arita (US\_6,905,949 B2) in view of Choo et al (US\_6,516,528 B1).

5. Claims 1-3, 8, 10-11, 14-15, 17-18, 20 and 23 are rejected because:

A. Arita discloses a system comprising a non-lithographic shrink component that selectively applies heat to a photoresist coating (see abstract, col.3, lines 32-35) for mitigating line edge roughness on pattern lines of a semiconductor device in order to improve packaging density and precision in semiconductor structure. However, Arita do not explicitly disclose a monitoring component such as a Scanning Electron Microscope (SEM) that

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analyzes the photoresist and controls the application of heat by the non-lithographic shrink component so as to heat the photoresist to a point prior to melting of the photoresist to mitigate line edge roughness on the pattern lines while retaining a target critical dimension of a semiconductor device, or a processor that processes data associated with at least one of critical dimension/line-edge roughness on a photoresist, in order to improve packaging density and precision in semiconductor structure.

- B. Choo et al (Choo hereinafter) discloses a system comprising a monitoring component such as a Scanning Electron Microscope (SEM) 12 (see col.4, lines 26-42) that analyzes the photoresist and controls the application of heat (see Figure 4, col.9, lines 16-37) by the non-lithographic shrink component so as to heat the photoresist to a point prior to melting (see col.3, lines 32-35) of the photoresist to mitigate line edge roughness on the pattern lines while retaining a target critical dimension of a semiconductor device, and a processor 34 (see Figures 1 and 4) that processes data associated with at least one of critical dimension/line-edge roughness on a photoresist (see col.4, line 61 – col.5, line 28), in order to improve packaging density and precision in semiconductor structure.
- C. In view of Choo's teachings, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a monitoring component such as a Scanning Electron Microscope, and a processor that processes data associated with at least one of critical dimension/line-edge roughness on a photoresist due to the fact that such a combination would provide a more efficient system and/or method to improve packaging density and precision in semiconductor structure.

6. Claims 6-7, 13 and 21 are rejected because Choo discloses a memory 36 component comprising at least one of volatile and non-volatile memory that stores data associated with at least one of mitigating line-edge roughness (see col.5, lines 37-53; Figure 1). Therefore, in view of Choo's teachings, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Choo's teachings into Arita's system/method due to the fact that such a combination would provide a more efficient system and/or method to improve packaging density and precision in semiconductor structure.

7. Claims 9, 16, 19 and 24-25 are rejected because Choo's system/method comprises at least one sensor that gathers data associated with at least one parameter of the physical condition of the photoresist (see col.4, line 61 – col.5, line 28), and generating feedback data that facilitates controlling at least one parameter associated with at least one of line-edge roughness mitigation (see Figure 4, col.9, lines 16-37). Therefore, in view of Choo's teachings, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Choo's teachings into Arita's system/method due to the fact that such a combination would provide a more efficient system and/or method to improve packaging density and precision in semiconductor structure.

8. Claims 4-5, 12 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arita (US\_6,905,949 B2) in view of Choo et al (US\_6,516,528 B1) and further in view of Singh et al (US\_6,570,157 B1).

9. Claims 4-5, 12 and 22 are rejected because:

- A. Arita and Choo discloses all claim limitations except that the processor comprises an artificial intelligence component that facilitates making inferences regarding at least one

of mitigating line-edge roughness, mitigating standing wave expression, and achieving target critical dimension on a photoresist, wherein the artificial intelligence component comprises at least one of a support vector machine, a neural network, an expert system, a Bayesian belief network, fuzzy logic, and a data fusion engine.

- B. Singh et al (Singh hereinafter) discloses a system that comprises a processor 44 (see Figures 2 and 3) comprising an artificial intelligence component that facilitates making inferences regarding at least one of mitigating line-edge roughness, mitigating standing wave expression, and achieving target critical dimension on a photoresist, wherein the artificial intelligence component comprises a neural network and a data fusion engine (see col.1, line 56 – col.2, line 9; col.3, line 55 – col.4, line 10).
- C. In view of Singh's teachings, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate into and/or combine Singh's with Arita's and Choo's system/method due to the fact that such a combination would provide a more efficient system and/or method to improve packaging density and precision in semiconductor structure.

### ***Conclusion***

10. The prior art cited in the accompanying PTO-892 is made of record and not relied upon, **is considered pertinent** to applicant's disclosure.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Roy M. Punnoose** whose telephone number is **571-272-2427**.

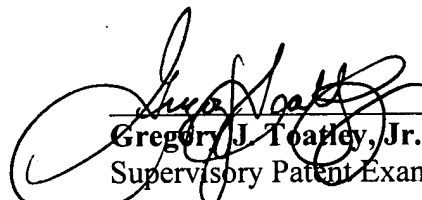
The examiner can normally be reached on 9:00 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Gregory J. Toatley, Jr.** can be reached on **571-272-2800 ext.77**. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**Roy M. Punnoose**  
Patent Examiner  
Art Unit 2877  
October 16, 2005



  
**Gregory J. Toatley, Jr.**  
Supervisory Patent Examiner  
17 Oct 05